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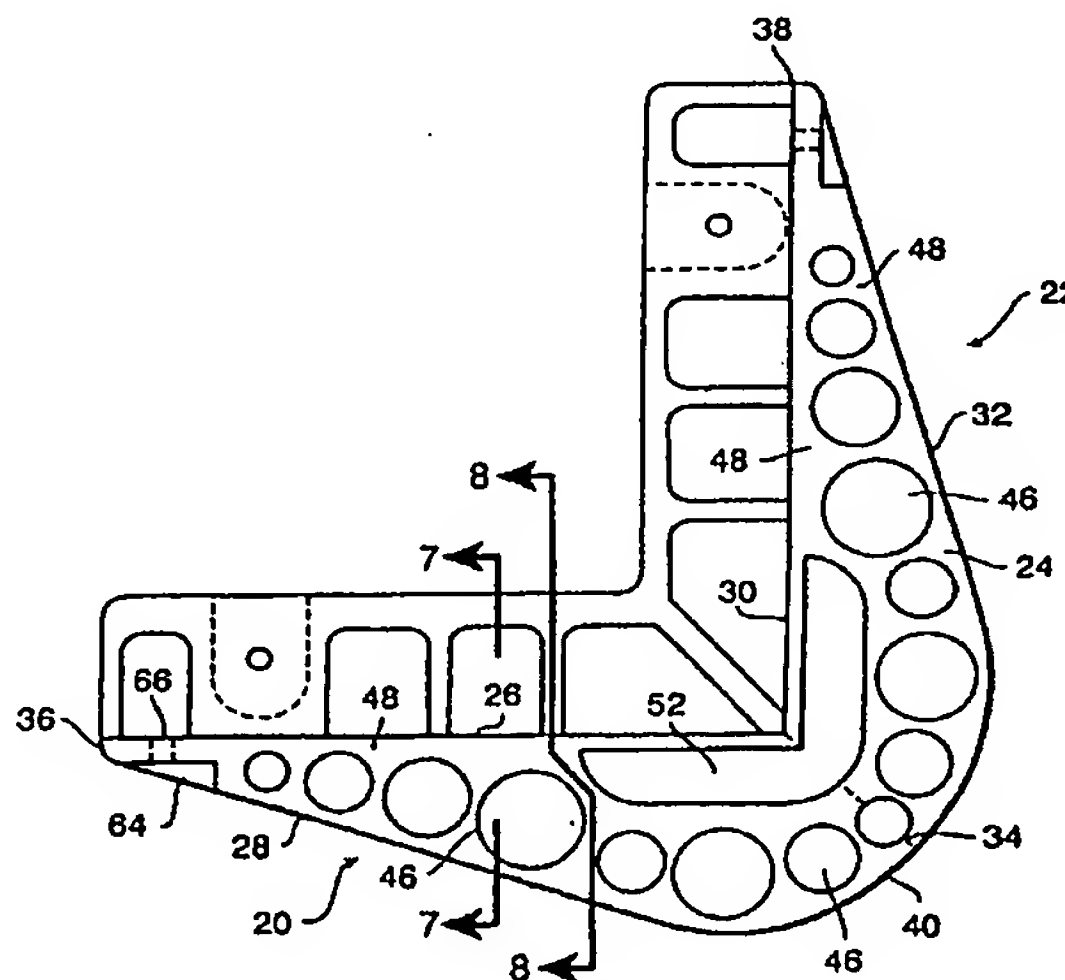
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**(54) Corner bumper for use on movable and fixed objects**

(57) A unique corner bumper for use on movable objects and particularly on movable vehicles, such as trucks and truck trailers, to protect a fixed or stationary object, such as a building or other rigid structure, against the force of an impact by the movable object. In another embodiment, the corner bumper can be used on a stationary object, such as a boat dock, to prevent damage from impact by a movable object, such as a boat and, in this case, the bumper would be secured to the fixed object, such as the boat dock. The corner bumper has a pair of elongate sections (20,22) integrally connected together at common ends and which elongate sections have generally perpendicularly arranged interiorly presented surfaces (26,30) and an upper top wall. The bumper has tapered exteriorly presented side wall surfaces (28,32) so that it is generally resistant to being sheared off of the movable object in the event of an impact with a stationary structure or, for that matter, from a fixed object by contact with movable object which engages the bumper in a shearing position, as on an end portion thereof. Moreover, the corner bumper is provided with interiorly formed openings (46) thereby effectively creating ribs (48) between the openings in the structure which are capable of at least partially collapsing or compressing upon impact.



**FIG. 5**

**EP 0 904 988 A2**

## Description

### BACKGROUND OF THE INVENTION

#### 1. Field of the Invention

[0001] This invention relates in general to certain new and useful improvements in corner bumpers used on movable objects for protecting stationary structures against impact by the movable object and, on fixed objects to protect a movable object or, for that matter, the fixed object against impact by another movable object.

#### 2. Brief Description of Related Art

[0002] Automotive vehicles, such as passenger automotive vehicles, and, for that matter, truck tractors are sometimes equipped with bumpers to preclude damage to a fixed structure, or otherwise, a stationary structure, upon engagement with that fixed or stationary structure, such as a building or a parked vehicle. In many cases, however, portions of a vehicle are not equipped with bumpers, as for example, the upper portions of a truck and trailer and, particularly, the rear portion of a trailer which may be backed-up toward a fixed building structure. If the trailer should contact that fixed or other stationary structure, damage would result not only to the fixed or stationary structure, but potentially to the trailer, as well.

[0003] This problem often occurs with utility trucks in various locations and, particularly, in airport environments. Frequently, after an aircraft reaches a parking area, several trucks are driven to that location in order to service the aircraft. Since the fuselage of the aircraft has a generally curved side walk, it is oftentimes difficult for a utility truck driver to properly estimate the distance of the rear of that truck to the aircraft. Consequently, impacts can readily arise with resultant damage to the aircraft.

[0004] Even a slight dent in the fuselage of an aircraft can constitute serious damage inasmuch as it will interfere with the aerodynamics of the aircraft. Thus, any type of impact usually results in damage which, in turn, causes the necessity of repair. In the case of a boat which approaches a boat dock, unless protection is provided, even a relatively slight impact against a boat dock can crack the hull of a boat, particularly if made of fiberglass. As a result, and due to the fact that corner bumpers are not effective on the boats, as such, a corner bumper would be needed on a boat dock or the like.

[0005] There have been certain proposed corner protectors, or so-called "corner bumpers". The only moderately partially effective corner protector which has been made available is one which is inflatable and uses air as a collapsible medium allowing the corner bumper to absorb the force of an impact.

[0006] This commercially available corner protector

comprises a pair of arms or elongate sections which are integrally connected to one another at common ends and includes a top wall to engage the corner of a truck trailer or otherwise the rear portion of a utility truck or a corner of a boat dock. Moreover, the interior of the elongate members is hollow and provided with a means to fill sealed pockets with air, much in the nature of a balloon.

[0007] As may be anticipated, these commercially available bumpers only have a limited life span and, even though they may be formed of a relatively durable material, they can rupture upon sufficient impact, or otherwise, allowing an escape of the air cushion. In addition, and after a reasonable period of time, they will become brittle and crack, again leading to a loss of the air cushion and thereby become relatively ineffective and incapable of performing their intended function.

[0008] There has been another proposed corner bumper which utilizes a plurality of outwardly projecting elements, such as fingers, on the exterior surface thereof and which are designed to either deflect or compress upon engagement with a fixed or stationary structure upon contact. These outwardly projecting elements are closely spaced apart from one another. However, these outwardly projecting fingers, even though formed of a moderately thick and durable rubber material, do not effectively absorb the force of an impact and, frequently, will break off of the bumper, thereby again interfering with its function and operation.

### BRIEF SUMMARY OF THE INVENTION

[0009] The present invention relates primarily to a corner bumper adapted for use on movable objects and also on fixed objects. The corner bumper can find use on movable objects in the nature of vehicles and which include, for example, truck tractors, truck trailers, single unit trucks and the like. Preferably, the corner bumpers are designed for use on the corners of such movable objects but they are also effective for use on other edge portions of an object. The also find effective use on stationary objects to protect the movable object or the stationary object. Thus, the corner bumper of the invention are also effective for use on fixed objects or other stationary objects as, for example, boat docks, in order to protect a boat against impact.

[0010] The term "stationary structure" is used in a broad sense to refer to any structure which may be in a stationary position when engaged by a movable object. Thus, for example, an airplane is normally a moving object. However, when parked at an airport hangar, it is temporarily a stationary or a fixed structure since it is parked and non-moving.

[0011] The corner bumper of the invention is unique in that it reduces the possibility of a shearing action on the bumper which might otherwise cause a removal of the corner bumper from a secured position on a utility truck or other vehicle or a fixed object or a movable object.

The bumper is uniquely designed so that its outer edges are relatively thin. As a result, any impact in the region of an edge of the bumper would likely avoid that edge and engage the greater surface area of the exterior side wall of the bumper, thereby precluding an actual shearing action. Moreover, the exterior side walls of the bumper are actually shaped with a proper taper from the outer edge to the corner portion so that they actually reduce the likelihood of any shearing of the corner bumper from a secured position on a vehicle or other movable object.

[0012] The corner bumper comprises a first elongate section having a first interiorly presented wall and first exteriorly presented wall. The bumper also includes a second elongate section connected to an end of the first elongate section and also has a second interiorly presented wall and a second exteriorly presented wall. The ends of the elongate sections which are connected together at a corner portion are preferably integrally formed together so that the two elongate sections constitute a single unit. The opposite ends, that is the unconnected ends of the elongate sections, are generally free ends, but which are tapered to relatively thin edges so as to reduce the possibility of a shearing action, as previously described.

[0013] Inasmuch as any impact with the exteriorly presented first and second walls of the corner bumper is likely to occur near the joined ends of the elongate sections at the corner portion, shearing action is relatively unlikely inasmuch as the corner bumper is tapered toward thin outer edges. If the shearing force would occur near an edge, it is likely to miss the edge, which is relatively thin, as aforesaid. However, if the shearing action occurs in an opposite direction, again the exteriorly presented side walls, they are tapered so as to preclude a shearing of the corner bumper from a secured position.

[0014] The present invention also provides a generally solid interior core extending between the first interiorly presented side wall and the first exteriorly presented side wall. In like manner, a generally solid interior core exists between the second interiorly presented side wall and the second exteriorly presented side wall. A large number of openings are vertically formed within this inner core and, effectively in combination, form large voids or non-material areas and also effectively form ribs therebetween. These voids are open and in communication with an exterior portion, such as a bottom portion of the elongate sections and thus do not form sealed air pockets.

[0015] The ribs which exist between the exteriorly and interiorly presented walls are effectively straddled by voids or open areas on both sides of the ribs. Because of this and the fact that the ribs are generally of proper size and thickness, they are partially collapsible or deflectable because of the voids and they help to absorb the force of an impact against the exteriorly presented wall of each elongate section.

#### BRIEF DESCRIPTION OF THE DRAWINGS

[0016] Having thus described the invention in general terms, reference will now be made to the accompanying drawings in which:

Figure 1 is a perspective view showing the exterior portions of a corner bumper constructed in accordance with and embodied in the present invention;

Figure 2 is somewhat of an oblique perspective view taken from an end portion of one of the elongate sections of the corner bumper of the present invention;

Figure 3 is a side elevational view of one of the elongate sections of the corner bumper of the present invention;

Figure 4 is a top plan view of the corner bumper of the present invention;

Figure 5 is a bottom plan view of the corner bumper of the present invention;

Figure 6 is an enlarged fragmentary perspective view showing a portion of the fastening area on Figure 4 of the drawings;

Figure 7 is a vertical sectional view substantially taken along line 7-7 of Figure 5;

Figure 8 is a vertical sectional view taken substantially along line 8-8 of Figure 5;

Figure 9 is a vertical sectional view similar to Figure 7, but showing deflection of a portion of the side wall of the corner bumper upon an impact;

Figure 10 is a vertical sectional view, similar to Figure 8, and showing deflection of a portion of the side wall upon an impact;

Figure 11 is an enlarged fragmentary bottom plan view of a portion of one of the elongate sections of the corner bumper;

Figure 12 is an enlarged fragmentary bottom plan view, similar to Figure 11, and showing collapsing of a portion of the structure upon impact; and

Figure 13 is a fragmentary perspective view showing the mounting of a corner bumper of the invention on a corner portion of a movable object.

#### DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

[0017] Referring now in more detail and by reference characters to the drawings which illustrate one of the preferred embodiments of the present invention, C designates a corner bumper having a first elongate section 20 and a second elongate section 22.

[0018] Each of the elongate sections 20 and 22 are generally identical in construction and are connected at common ends, preferably at approximately right angles relative to one another, as best shown in Figures 1 and 2 of the drawings. Consequently, portions of the one elongate section 20 will be described in detail, with it being understood that such description is applicable to



the generally perpendicularly arranged other elongate section 22.

[0019] The elongate<sup>sub</sup> 20 generally comprises an interior core 24 preferably formed of a relatively rigid yet compressible plastic or rubber material, such as vinyl, although any of the other previously identified materials could be employed for this purpose. The core integrally merges into an interiorly presented side wall 26, as shown in Figure 5, and an exteriorly presented side wall 28, as best shown in Figure 4. In like manner, the elongate section 22 has an interiorly presented side wall 30 and an exteriorly presented side wall 32, and the side wall 32 of which extends to a common corner or joinder region 34, as hereinafter described.

[0020] The side walls 26 and 28 of the elongate section 20 merge into a relatively thin free edge 36 at the right-hand end, reference being made to Figure 1. In like manner, the interiorly presented wall 30 and the exteriorly presented wall 32 of the elongate section 22 also merge into a relatively thin outer or free vertical edge 38, also as best shown in Figure 5 of the drawings. The thickness of the elongate sections 20 and 22 respectively increase almost uniformly from the free or unconnected ends to the joinder region 34, as is best illustrated by reference to Figure 5 of the drawings. In other words, commencing from the relatively thin end 36 of the elongate section 20, the exteriorly presented wall 28 diverges away from the interiorly presented wall 26, as best shown in Figure 5 of the drawings. In like manner, the exteriorly presented wall 32 of the elongate section 22 diverges outwardly from the interiorly presented wall 30, commencing from the relatively thin outer edge 38 almost until the region of the joinder 34. In this way, as the elongate sections increase from the outer ends, they progressively have a thicker cross-section.

[0021] The outer corner portion 40 where the exterior walls 28 and 32 integrally merge is arcuate in shape as best illustrated in Figures 4 and 5 of the drawings.

[0022] By further reference to Figures 1 and 5 of the drawings, it can be seen that each of the exterior side wall surface 28 and 32 also taper inwardly toward the respective interiorly presented side wall surface 26 and 30, respectively, in the regions of their lower ends 44. In this way, there is, again, a reduced likelihood of causing a shearing action if a force of an impact should engage the corner bumper at any one of the lower edges.

[0023] The interior core 24 of each of the elongate sections 20 and 22 are also provided with a large number of vertically arranged openings or channels, as best shown in Figures 1 and 5 of the drawings. Some of those openings terminate in the lower corner regions 44 as shown in Figures 1 and 3 of the drawings. Moreover, each of these openings 46 are generally circularly shaped, although other shaped openings could be employed, if desired. Moreover, it can be seen that the regions existing between each of the openings 46 form ribs 48. These ribs 48 are not necessarily of linear side walls, although the openings 46 do effectively form ribs

48 which extend between the respective interiorly presented walls and the exteriorly presented walls.

[0024] These openings or channels effectively open at their lower ends so that the openings or channels are constantly air filled at ambient pressure, as best shown in Figure 7 of the drawings. Nevertheless, upon an impact, as shown in Figure 9, it can be seen that the openings 46 will compress in the region of the impact, as shown. Since the material of construction of the core is relatively elastic, these regions of impact 50 will return to their original undeflected position as shown in Figures 7 and 8 upon removal of the force resulting from the impact.

[0025] In addition to the foregoing, the core material is chosen so that it will also have some degree of resiliency. Thus, even in the regions where there are no openings, as shown in Figures 8 and 10, the region of impact 50 in Figure 10 will generally return to its original shape, as shown in Figure 8, after the force which caused the impact has been removed.

[0026] The grouping of a large number of openings in the region of joinder 34 has also been found to be preferable, since this is the region which typically receives the greatest impact. Again, the density of the hole pattern can vary depending upon the materials of construction which are employed and the intended use of the corner bumper. Further, and as indicated above, the shape of the openings can also vary and are not necessarily limited to circular openings, but they could be triangular, rectangular, etc.

[0027] The elongate sections 20 and 22 are each provided, adjacent their lower ends, with recesses 64 and aligned fastener receiving holes 66, which are sized to receive conventional fasteners, such as sheet metal screws or the like. In this way, the elongate sections can be secured to a movable object such as a truck trailer or a stationary object, such as a boat dock. These recesses and fastener receiving holes are located so that the corner bumpers can be secured to a movable object or a stationary object, or both.

[0028] The corner bumper C is also provided with a top wall 68 which is comprised of a top lip 70 extending inwardly from the elongate section 20 and a top lip 72 extending inwardly from the elongate section 22 and which are again integrally joined in a joinder region 74. The top wall 68 may be secured to the elongate sections 20 and 22 or they may be integral therewith. The top wall 68 is formed of the same material used in the formation of the elongate sections 20 and 22.

[0029] The lips 70 and 72 are each formed of a generally solid-core material and are not provided with openings in the same manner as the elongate sections 20 and 22. However, it should be understood that, if desired, the lips 70 and 72 could also be provided with holes in the same manner for purposes of collapsing in the event of an impact. However, it has been found that there is typically little likelihood of impact on the upper surface of the top wall 68 and that the material of con-

struction is generally sufficient to compress and absorb the force of any impact.

[0030] The top wall 68 is somewhat hemispherically shaped although it increases from relatively wide transverse ends 76 and 78 to the region of joiner 74. The exterior margin of the top wall 68 also conforms to that of the upper margin on the exterior walls 28 and 32 of each of the elongate sections 20 and 22, respectively.

[0031] By further reference to Figure 2, it can be seen that the lips 70 and 72 are each of a relatively thick crosssection, that is, from exterior wall to interior wall in the region of the joiner 74, and that there is a generally uniform but increasing divergence of the outer margins of the lips 70 and 72 as they progress from the respective ends 76 and 78 to the region of joiner 74.

[0032] The lips 70 and 72 are each provided with recesses 80 and 82, respectively, along their upper surfaces and communicating fastener receiving openings 84 and 86 to receive conventional fasteners, such as sheet metal screws (not shown). Again, and although only two such fastener receiving recesses have been shown, it should be understood that any number of desired recesses can be employed.

[0033] Figure 13 illustrates the corner bumper C used on a movable object such as a truck T. In this case, the truck T has a pair of side walls 90 and 92 along with a top wall 94.

[0034] The present invention has been largely described in connection with the use of the corner bumper on a movable object and, although that is unique application, the invention is also highly effective for use on fixed objects to protect against impact with a movable object. In this case, the corner bumper may be designed to protect the fixed object, such as a boat dock; or it may be designed to protect the boat against that impact or both. In either case, the corner bumper is highly effective.

#### Claims

1. An improved corner bumper [C] for use on one of a stationary object or a movable to prevent impact and resultant damage to the movable object or stationary object or both, and which comprises a pair of elongate sections [20] and [22] connected at a common end, said improved corner bumper characterized in that:

- a) said first elongate section [20] having a first interiorly presented wall [26] and a first exteriorly presented wall [28];
- b) said second elongate section [22] connected to an end of said first elongate section [20] such that the first and second sections have opposite ends [36] and [38] which are not connected to one another; and
- c) said second elongate section [22] having a second interiorly presented wall [30] and a sec-

ond exteriorly presented wall [32], said second interiorly presented wall [30] being at an angle with respect to said first interiorly presented wall [26] to engage and allow for securement to the outer walls of a movable object or a stationary object and the exteriorly presented walls [28], [32] of each section being tapered inwardly from the connected ends to the opposite ends [36] and [38] so that a shear force applied to one or both of the exteriorly presented walls [28] and [32] will not force the corner bumper from a fixed and secured position on the object.

2. The corner bumper of Claim 1 further characterized in that fastening means [66] is provided on each of said elongate sections [20] and [22] to allow those sections to be secured to a movable object or stationary object.
3. The corner bumper of Claim 1 further characterized in that a top wall [68] extends over a portion of said first and second elongate sections and is sized to engage a top wall portion of the object to which it is secured.
4. The corner bumper of Claim 1 further characterized in that the first and second interiorly presented walls [26], [30] are located at approximately right angles to one another.
5. The corner bumper of Claim 4 further characterized in that a top wall [68] extends over portions of said first and second elongate sections [20], [22] and is sized to engage a top wall portion of a object to which it is secured, and said top wall is also generally perpendicularly arranged with respect to said first and second interiorly presented walls [26], [30].
6. The corner bumper of Claim 1 further characterized in that said first interiorly presented wall [26] and first exteriorly presented wall [28] are tapered relative to one another to merge into a relatively thin end section [36] and that said second interiorly presented wall [30] and said second exteriorly presented wall [32] are tapered relative to one another to merge into a relatively thin end section [38] so as to reduce the possibility of a shearing action with respect to the bumper.
7. The corner bumper of Claim 1 further characterized in that a plurality of ribbed portions [48] extend between said interiorly and exteriorly presented walls [28], [32] of each elongate section.
8. The corner bumper of Claim 1 further characterized in that an interior core material extends between the exteriorly and interiorly presented walls [26],

- [30] of each elongate section [20], [22] and openings exist in said core material [24] and form ribs [48] between the interiorly and exteriorly presented walls of each elongate section, said ribs being of such thickness so as to be a least partially collapsible so as to absorb the force of an impact. 5
9. An improved corner bumper C for use on one of a movable object or stationary object to prevent impact and resultant damage to the movable object or stationary object, or both, in accordance with Claim 1, characterized in that said second interiorly present wall [30] is at an angle with respect to said first interiorly presented wall [26] to engage the outer walls of a movable or stationary object to which it is secured. 10 15
10. The improved corner bumper for use on one of a movable object or stationary object of Claim 9 further characterized in that said corner bumper comprises: 20
- a) an interior core material [24] extends between the interiorly and exteriorly presented walls of each elongate section; and 25
  - b) means forms a plurality of openings [46] in said core material 24 and being of such size and spacing relative to one another to form a plurality of ribs [48] extending between the interiorly and exteriorly presented walls of each elongate section, said ribs [48] being of such size and thickness as to be partially collapsible to absorb the force of an impact against the exteriorly presented wall of each elongate section. 30 35
11. The improved corner bumper of Claim 9 further characterized in that a top wall [68] extends over a portion of said first and second elongate sections [20] and [22] and is sized to engage a top wall portion of an object to which it is secured, the first and second interiorly presented walls [26], [30] are located at approximately right angles to one another, said top wall [68] is comprised of a first and second lip sections [70], [72] which are connected together at ends common to the connected ends of the exteriorly and interiorly presented walls and are of greater cross-sectional thickness in regions where the lips are connected to the respective elongate sections, and that said first and second elongate sections [20] and [22] are generally symmetrical to one another and that the connection [34] of the first and second elongate sections is an integral connection. 40 45 50 55
12. An improved corner bumper C for use on one of a movable object or a stationary object to prevent impact and resultant damage to the stationary

structure or movable object, or both, said corner bumper characterized in that:

- a) a first elongate section [20] having a first interiorly presented wall [26] and a first exteriorly presented wall [28];
  - b) a second elongate section [22] connected to an end of said first elongate section such that the first and second sections [20], [22] have opposite ends [36], [38] which are not connected to one another;
  - c) said second elongate section [22] having a second interiorly presented wall [30] and a second exteriorly presented wall [32], said second interiorly presented wall [30] being at an angle with respect to said first interiorly presented wall [26] to engage the outer walls of a movable or a stationary object and the exteriorly presented walls [28], [32] of each section being tapered inwardly from the connected ends to the opposite ends [36], [38] so that shear force applied to one or both of the exteriorly presented walls will not force the corner bumper from a fixed and secured position on the object to which it is secured;
  - d) an interior core material [24] extending between the interiorly and exteriorly walls of each elongate section; and
  - e) means forming a plurality of openings [46] in said core material [24] and being of such size and spacing relative to one another to form a plurality of ribs [48] extending between the interiorly and exteriorly presented walls of each elongate section, said ribs [48] being of such size and thickness as to be partially collapsible to absorb the force of an impact against the exteriorly presented wall of each elongate section.
13. The improved corner bumper C for use on one of a movable object or a stationary object of Claim 12 further characterized in that a top wall [68] extends over a portion of said first and second elongate sections [20], [22] and is sized to engage a top wall portion of movable object.
14. The improved corner bumper C for use on one of a movable object or a stationary object of Claim 12 further characterized in that the first and second interiorly presented walls [26], [30] are located at approximately right angles from one another, and said top wall [68] is comprised of first and second lip sections which are connected together at ends common to the connected ends of the exteriorly and interiorly presented walls and are of greater cross-sectional thickness in regions where the lips are connected to the respective elongate sections.

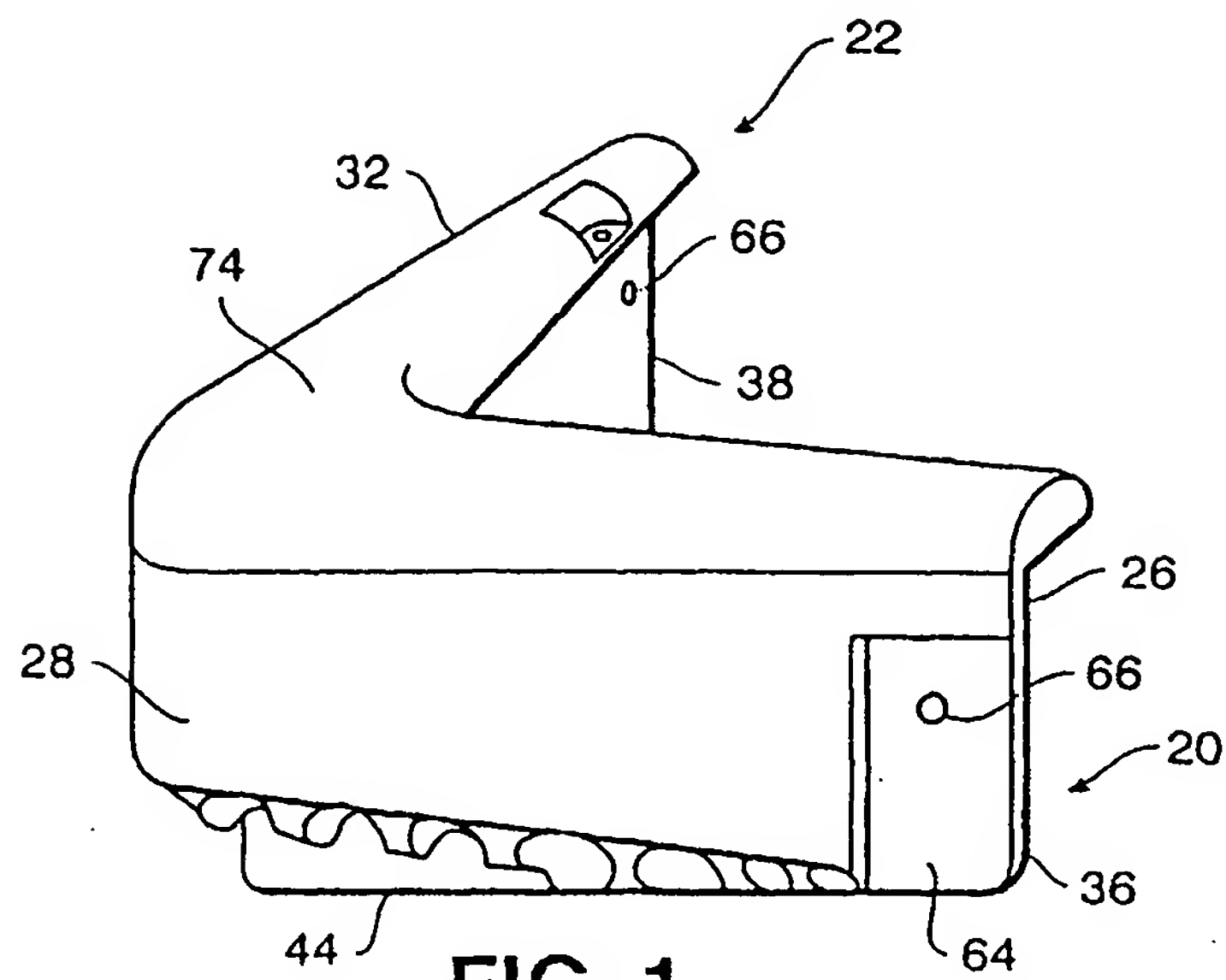


FIG. 1

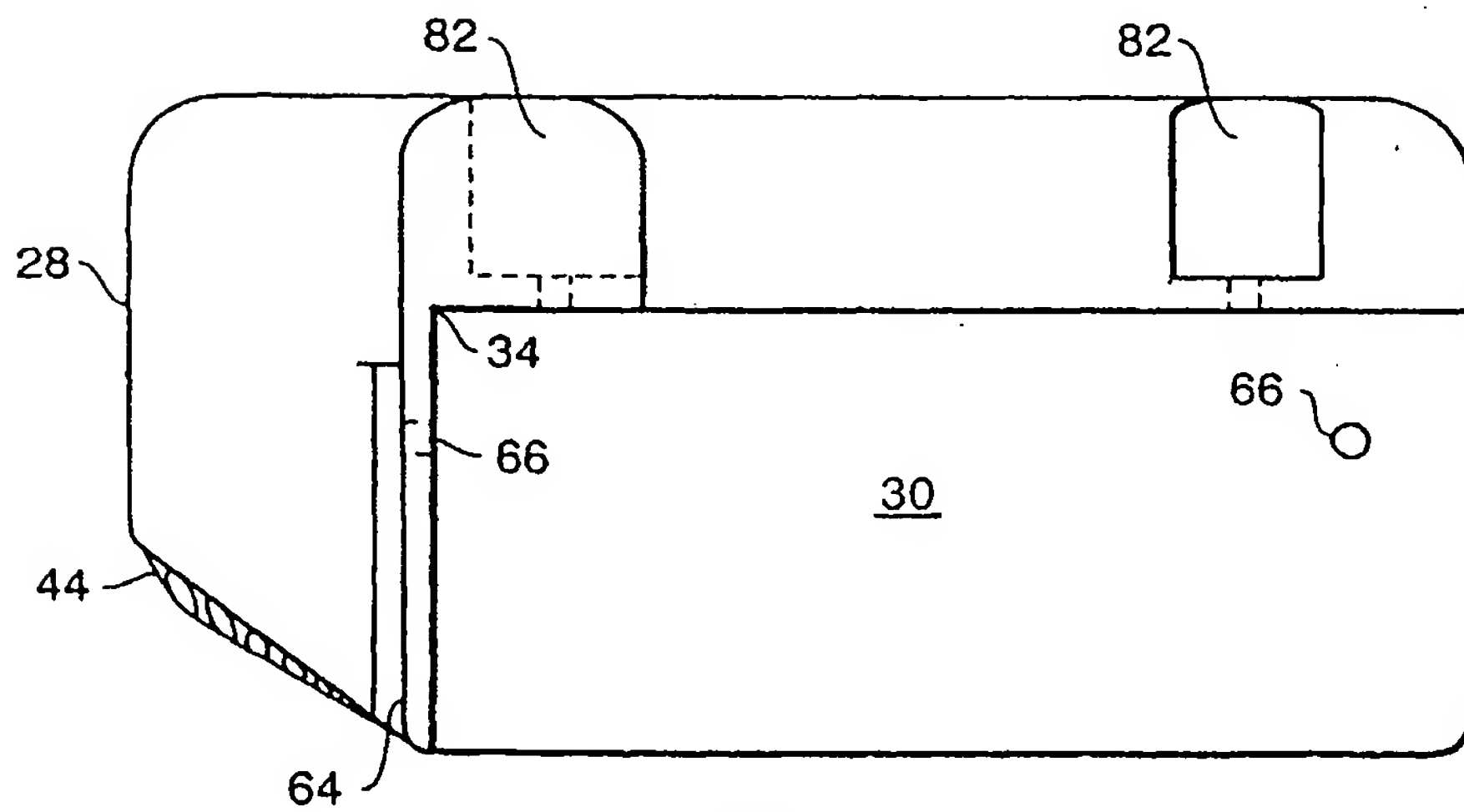


FIG. 3

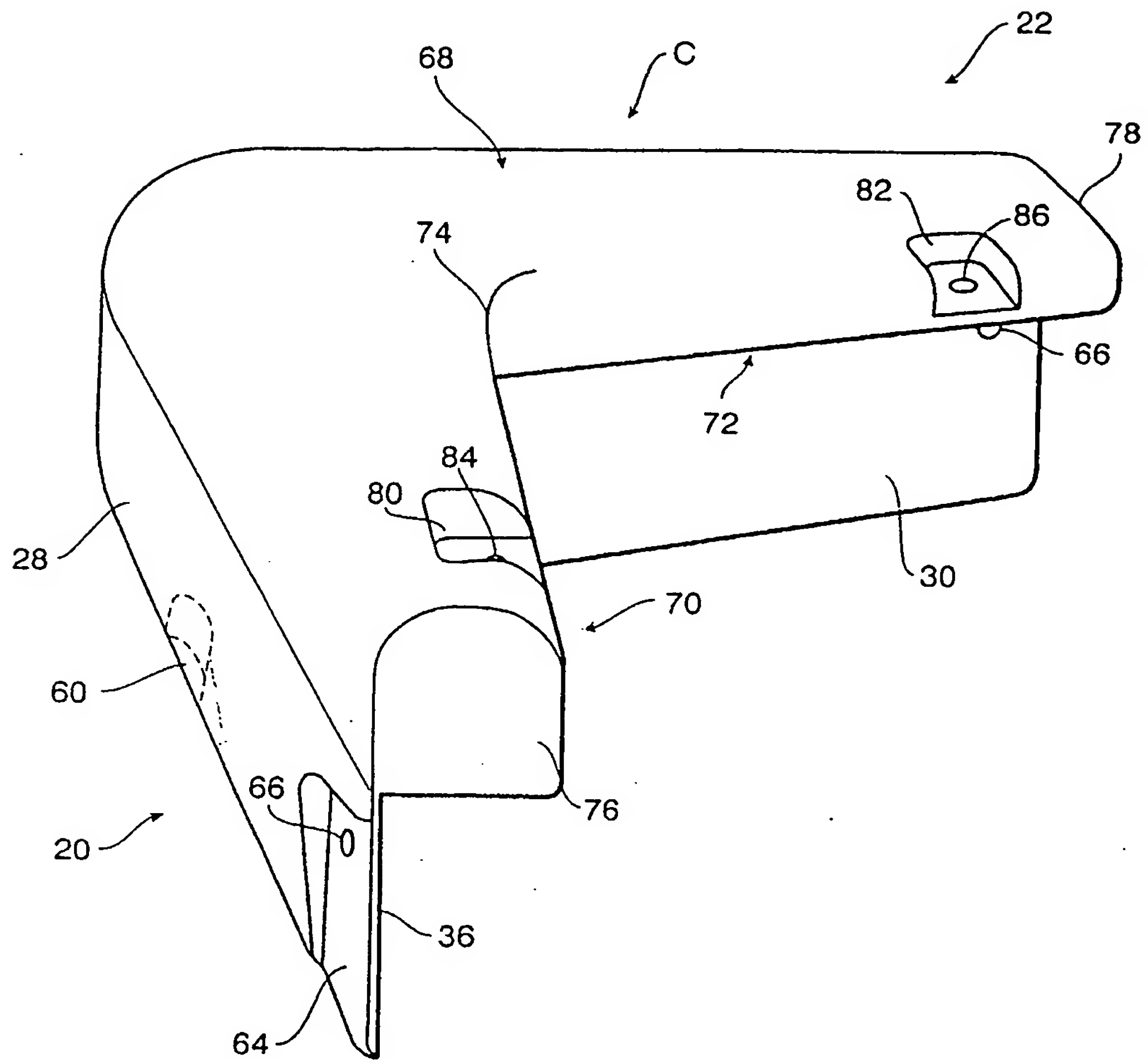


FIG. 2



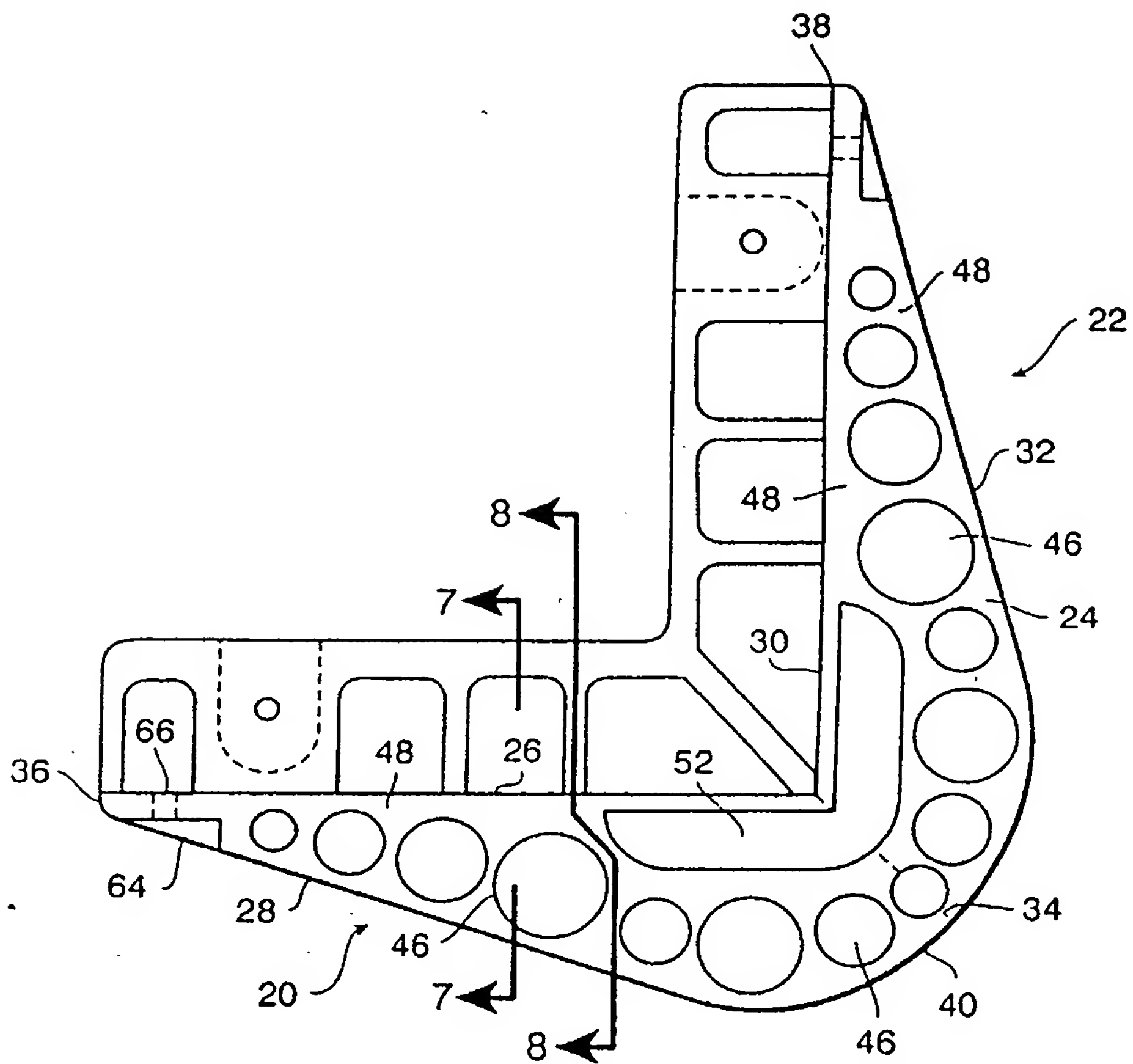
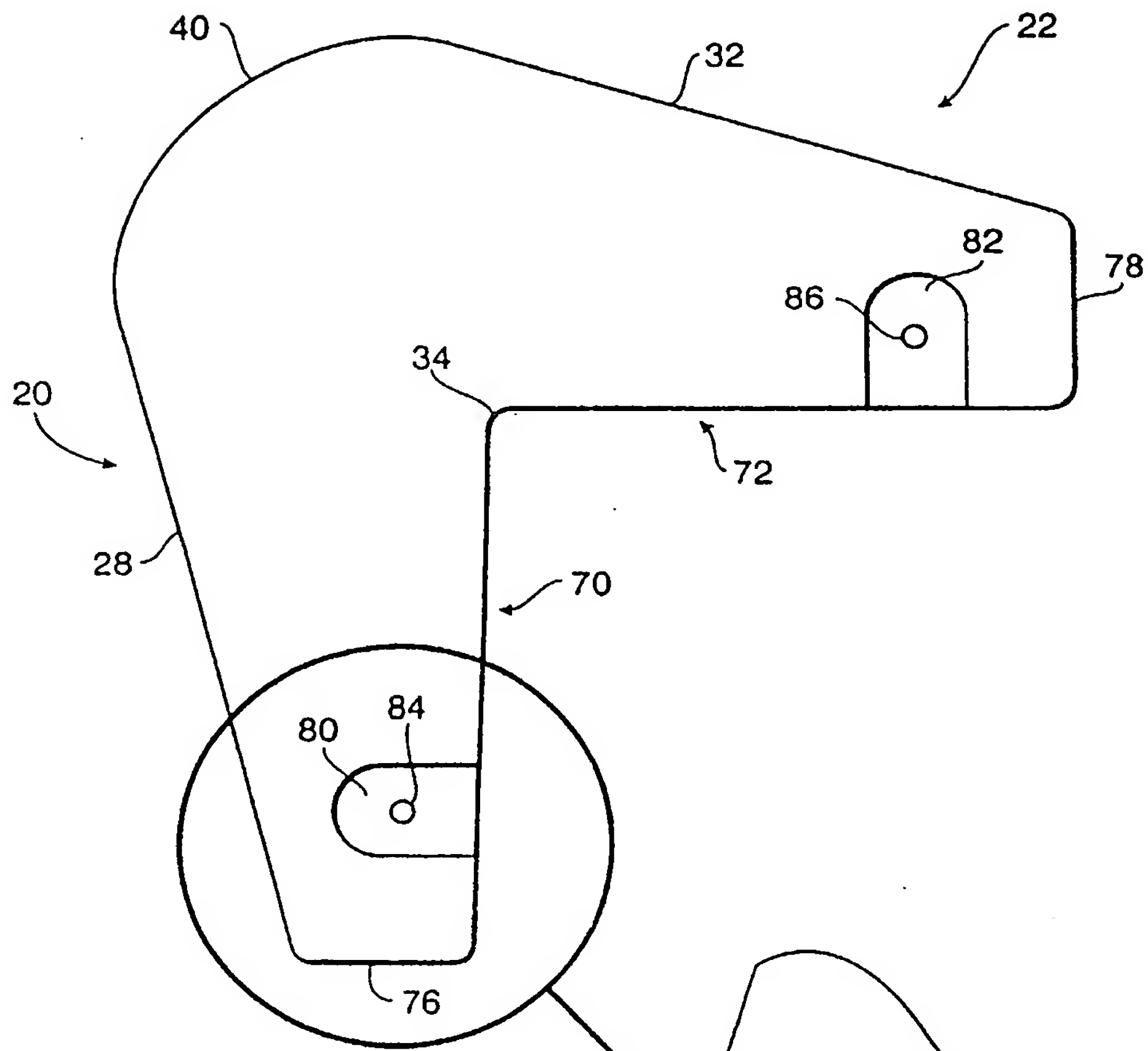
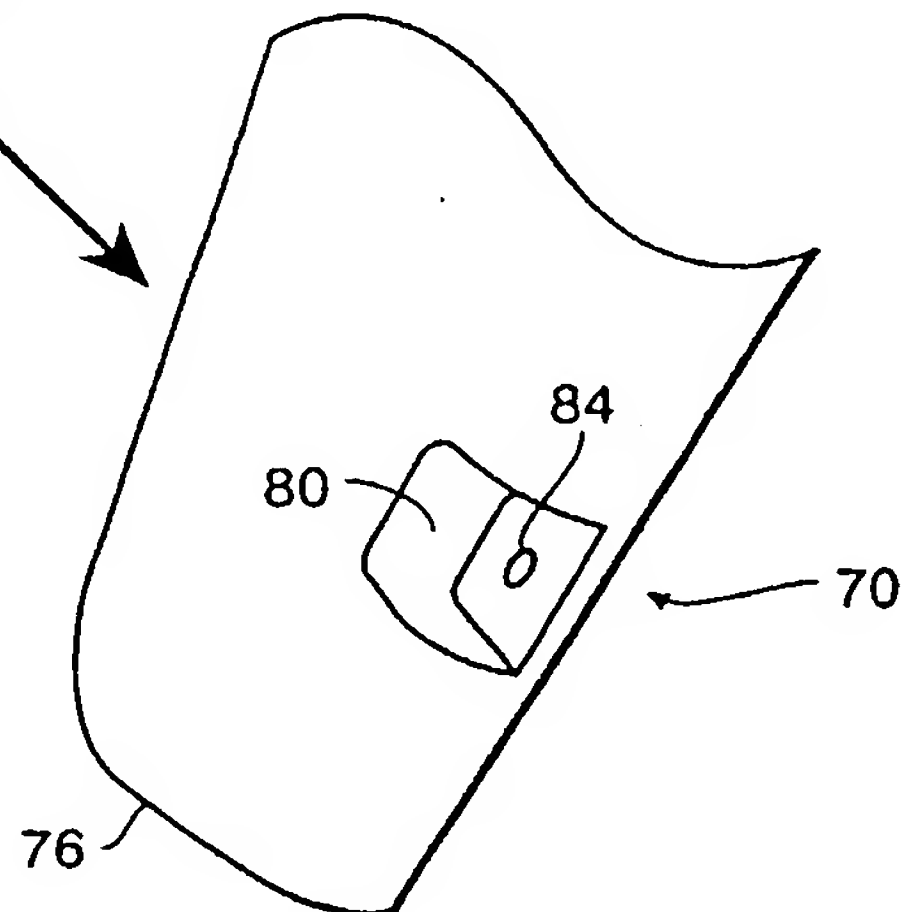


FIG. 5



**FIG. 4**



**FIG. 6**

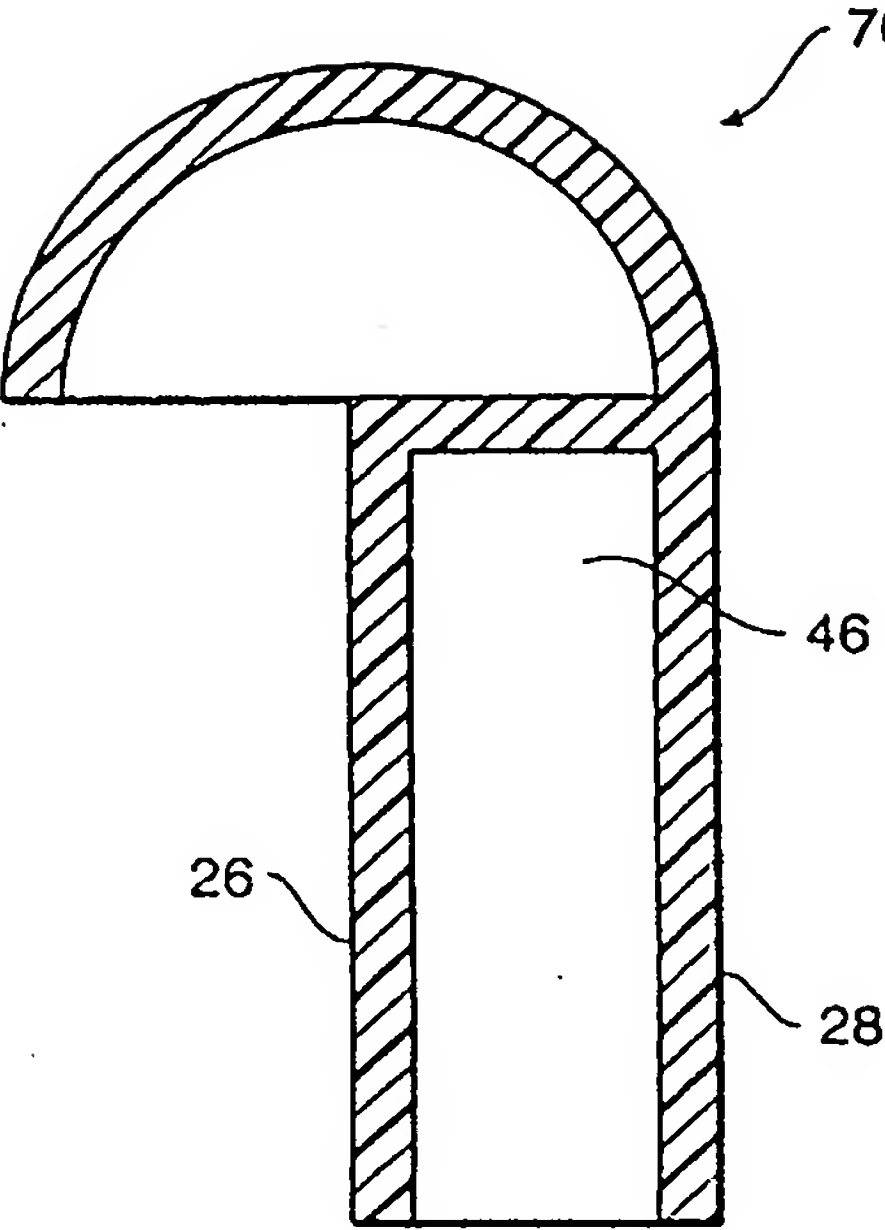


FIG. 7

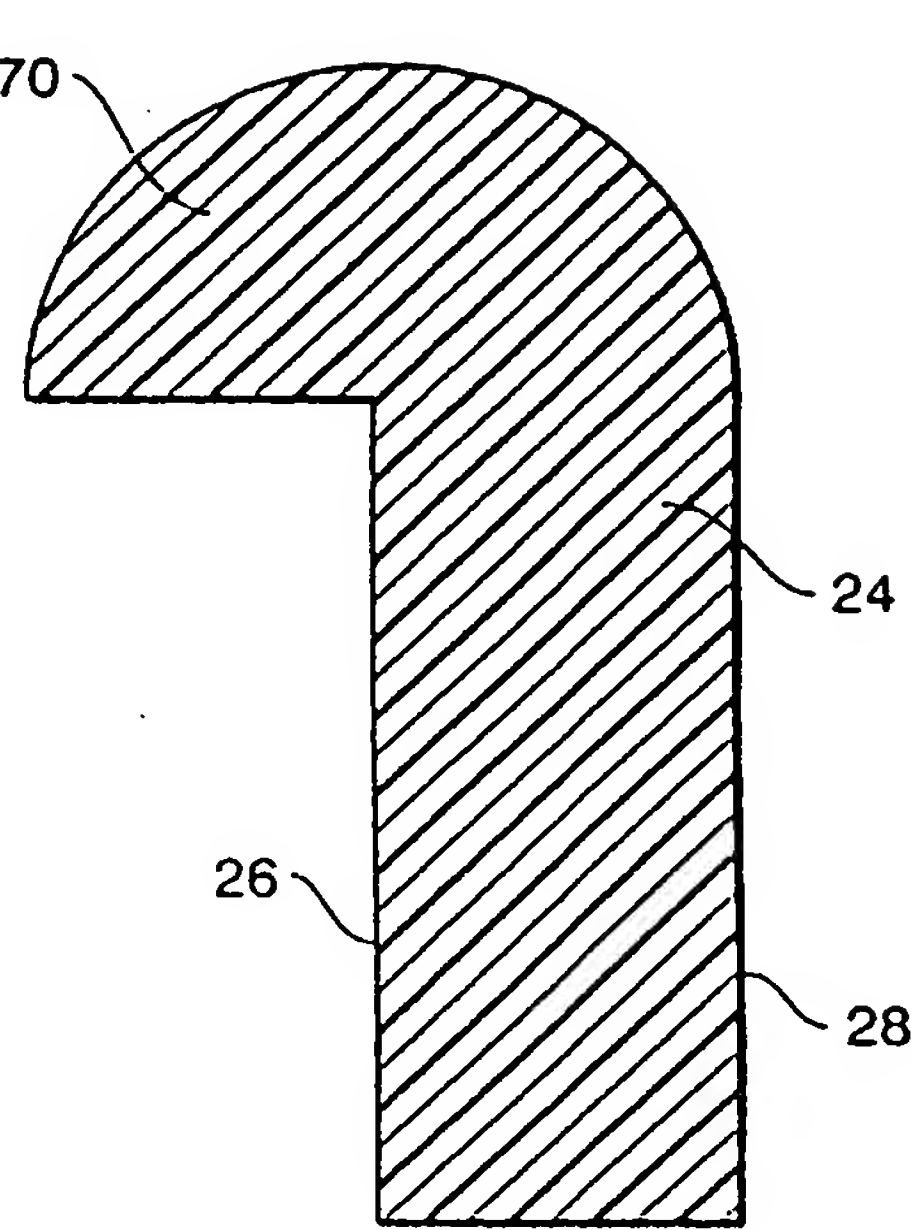


FIG. 8

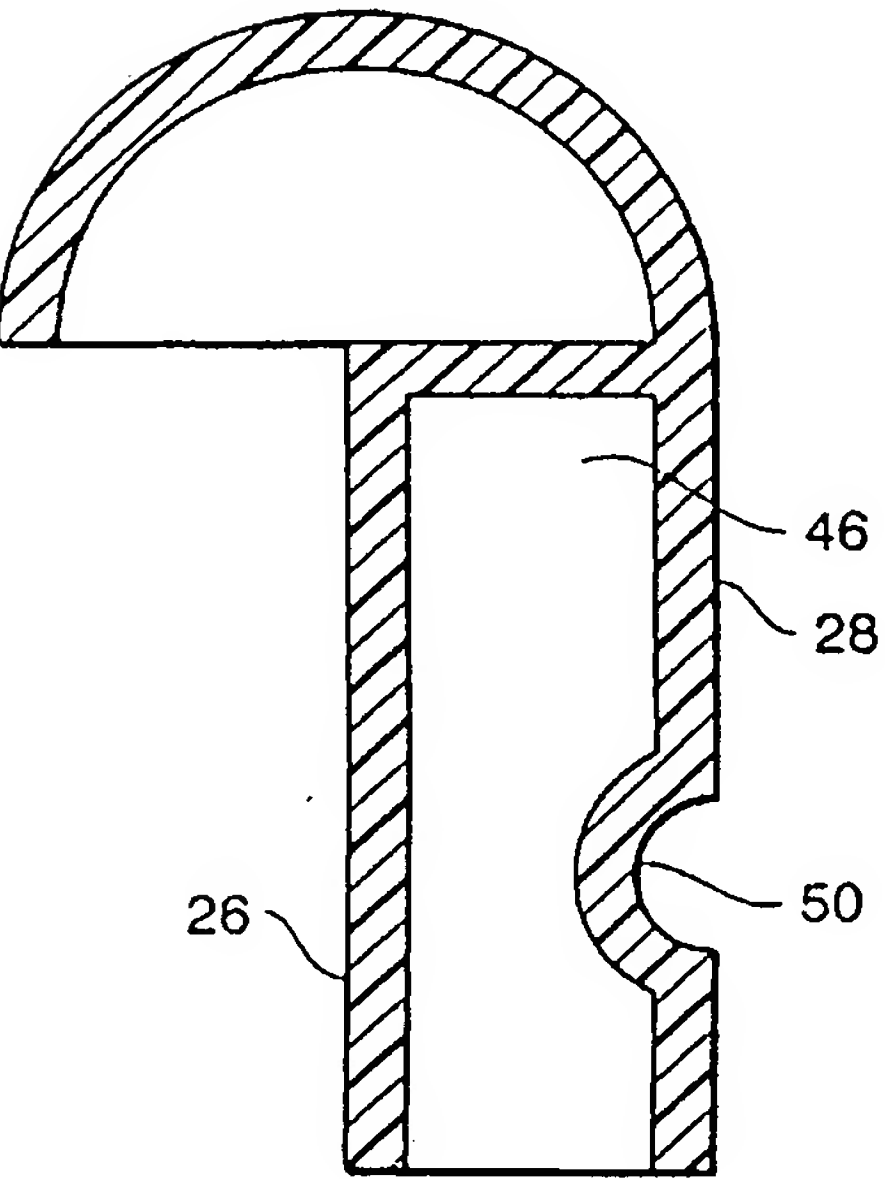


FIG. 9

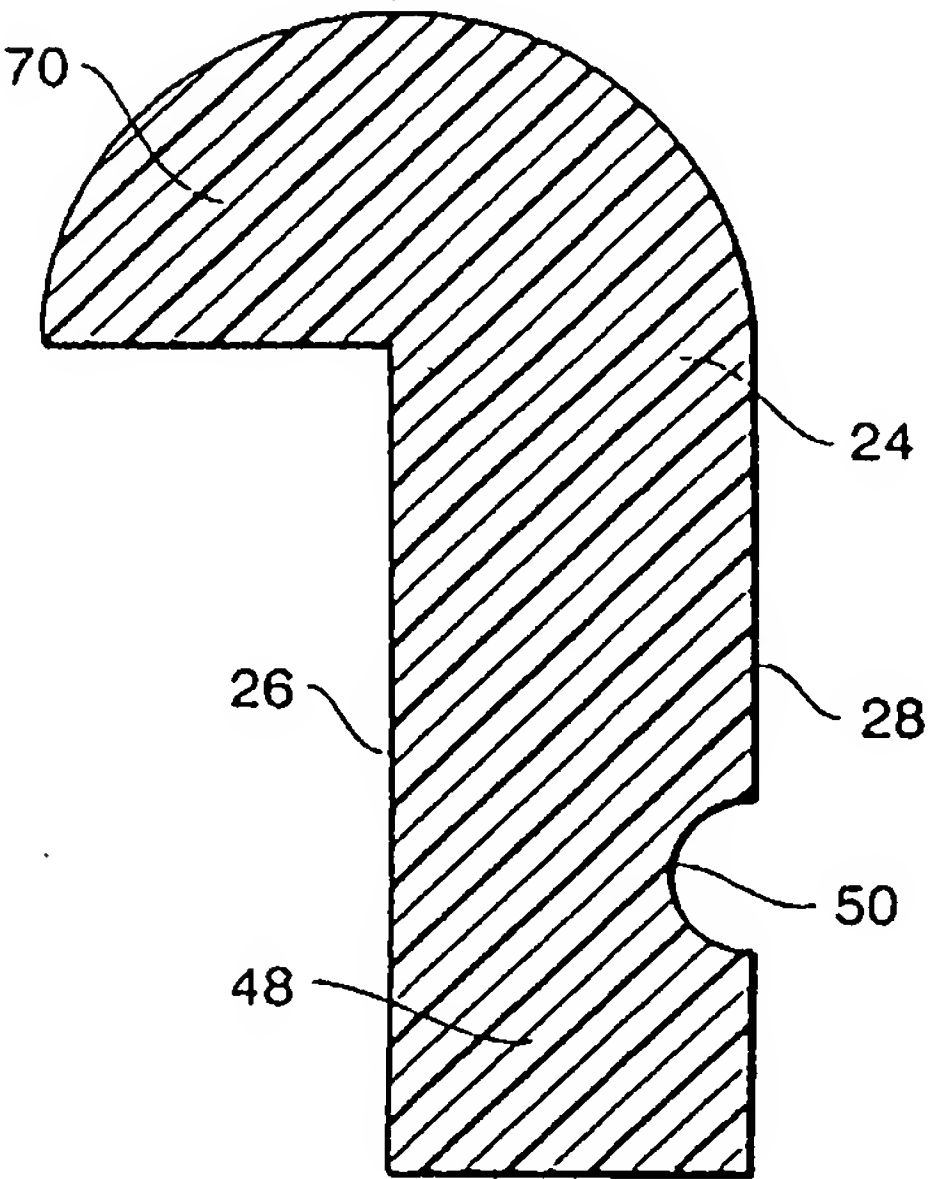


FIG. 10

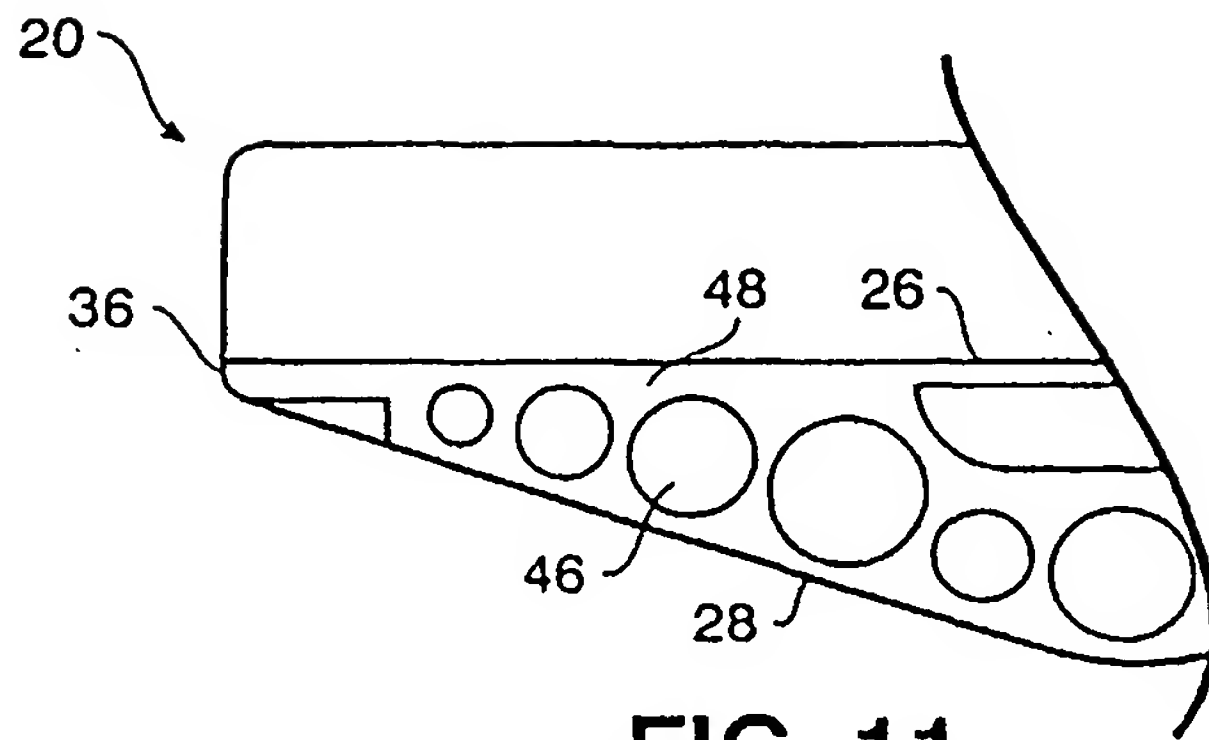


FIG. 11

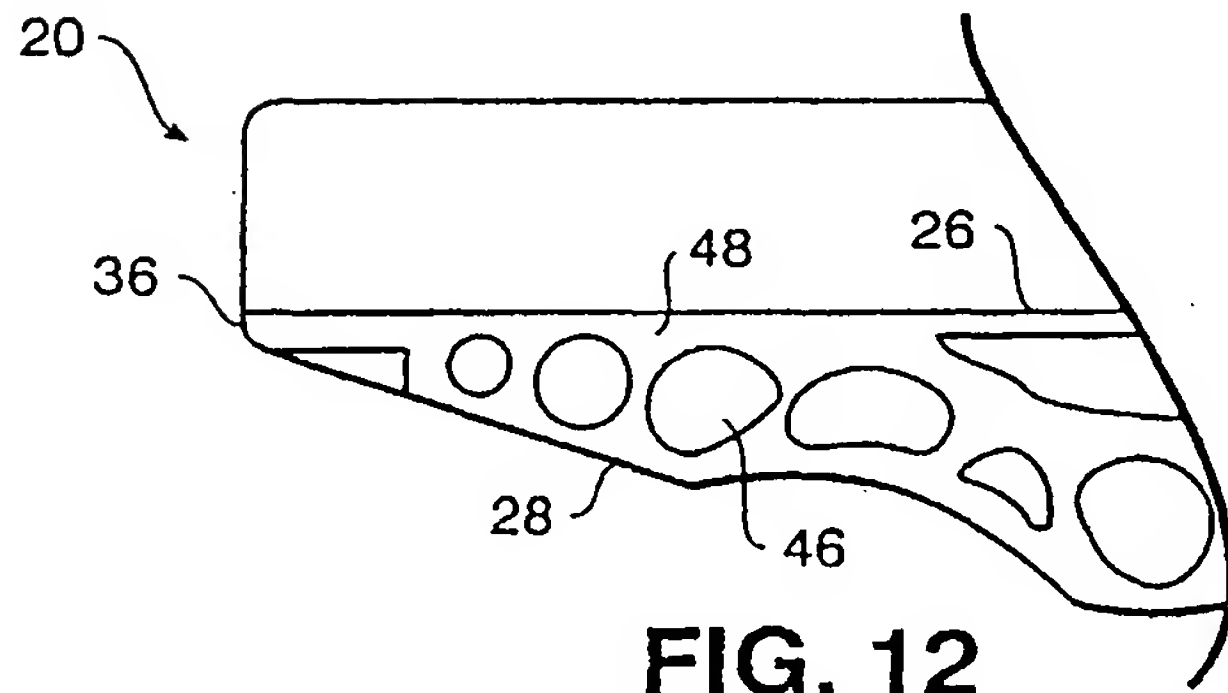


FIG. 12

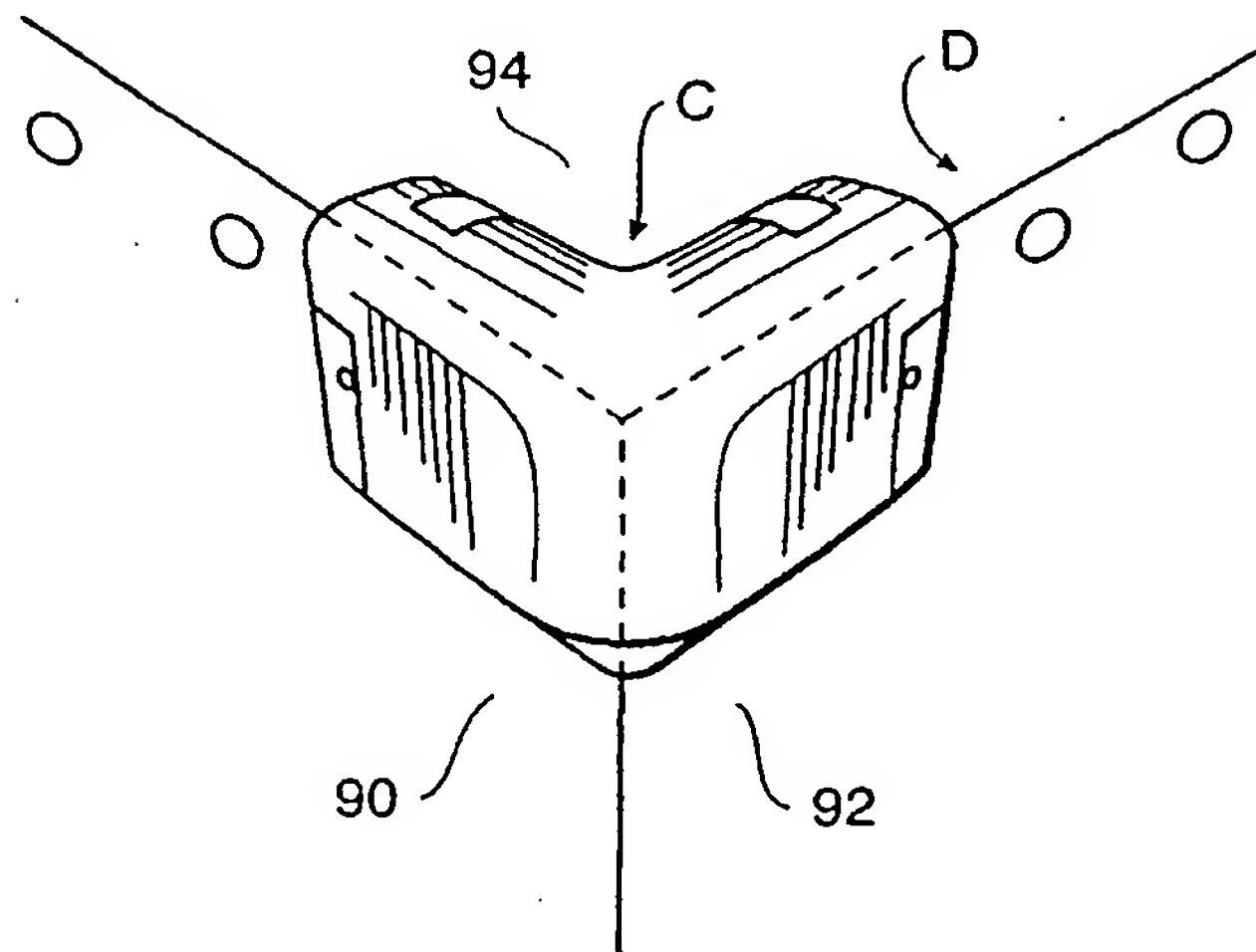


FIG. 13